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ABSTRACT

A study investigated the order of acquisition of inflectional morphology in English within morphemes, focusing on late acquisition of one allomorph of the plural. It is proposed that late acquisition is rooted in the operation of the Obligatory Contour Principle (OCP), which states that at the melodic level, adjacent identical elements are prohibited. The OCP and its operation in English are described. Based on data on acquisition of the allomorph in question, it is argued that the underlying phonological representation of the plural is a single consonant /z/, not a syllable incorporating a schwa, and that the OCP operates to trigger epenthesis of the schwa rather than to block its deletion. (MSE)

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THE FUNCTION OF THE OBLIGATORY CONTOUR PRINCIPLE IN ENGLISH: EVIDENCE FROM CHILD LANGUAGE*

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1. Introduction.

Brown's (1973) Stage II is characterized by the onset of the acquisition of inflectional morphology in English. Research on this stage has focussed on the order of acquisition both across morphemes and within morphemes. Here, I am concerned with the latter, with the acquisition of inflectional allomorphy. In particular, I focus on the [əz] allomorph of the plural because its acquisition bears directly on a contentious issue in recent phonological literature, the role of the Obligatory Contour Principle (OCP). My goal is to determine how the OCP operates in English, both in acquisition and in adult grammar.

I attempt to account for the stages in the acquisition of the [əz] allomorph as well as for the late appearance of [əz] vis-à-vis the other plural allomorphs. Most of the discussion centres on a type of error which T term 'gemination' where the child simply adds [s] or [z] directly to the root, yielding [horss] and [rozz], for instance, as the plurals of horse and rose respectively. I suggest a parametric account of the operation of the OCP to explain both gemination and the other stages in the acquisition of the [əz] allomorph.

2. Plural allomorphy in English.

The English plural has three phonologically conditioned allomorphs, a syllabic allomorph, [əz], and two nonsyllabic allomorphs, [z] and [s]. Their distribution is as in (1).

(1) Distribution of English plural allomorphs
- [z] after sonorants: e.g. dome, tail, shoe
- [z] after voiced nonsibilant obstruents: e.g. bed, dog, sieve
- [s] after voiceless nonsibilant obstruents: e.g. cap, lake, bath
- [əz] after sibilants: e.g. horse, dish, judge

Crucially, the syllabic allomorph [əz] appears after roots ending in sibilants. The OCP is responsible for the intrusive [ə]; it functions to break up sequences of (nearly) identical segments which would otherwise end up adjacent to one another.

3. The Obligatory Contour Principle.

I will briefly discuss those aspects of the phonological theory I am assuming which are relevant to the formulation of the OCP. In current nonlinear theory, phonological representations are multiplanar. Segments (actually bundles of hierarchically organized features) are linked to a central core consisting of skeletal slots. The slots, noted by Xs, indicate the number of segments in the representation. See (2).

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(2) Nonlinear representation of stitch

```
X X X  X    skeletal tier
| | | / \
s t ɪ t š   segmental/melodic tier
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Affricates are represented as two segmental matrices linked to one skeletal slot (Clements & Keyser 1983). In (2), [tš] consists of one segmental matrix which is identical to that for [t] and another which is identical to that for [š]. It is thus not surprising that [tš] and [dž] pattern with [š] and [ž] in the plural.

The OCP is given in (3). It disallows sequences of identical elements on the segmental tier where 'element' refers to whole segments or features, depending on the language. It is claimed to be universal.

(3) Obligatory Contour Principle (McCarthy 1986:208)
At the melodic level, adjacent identical elements are prohibited.

Languages may allow adjacent identical elements, but the OCP requires that they share melodic structure at the point where the violation would occur. For example, if a language allows geminates, the OCP requires that all melodic material be shared. The representation must be as in (4)A and not as in (4)B.

(4)A. Licit representation of pp

```
X  X
 \ /
  p
```

B. Illicit representation of pp

```
*X  X
 |  |
 p  p
```

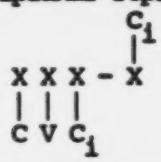
The OCP is not simply representational in nature. For instance, it has long been known that geminates cannot be split by rules of epenthesis (Kenstowicz & Pyle 1973). The OCP disallows epenthesis into geminates as the association lines between the skeletal tier and the segmental tier would necessarily cross; this is prohibited by the theory of nonlinear phonology (Goldsmith 1976, inter alia). See (5).

(5) Epenthesis between pp

```
*X X X  or *X X X
  \ X        X /
   p ə      ə p
```

Before discussing how the OCP operates across morphemes boundaries, I will briefly review McCarthy's (1979, 1986) theory of morpheme concatenation as much of the literature on the OCP assumes it. McCarthy proposes the Morphemic Plane Hypothesis where each morpheme enters the representation with its segmental material on a separate plane. Skeletal material of different morphemes is aligned from the start. The representation of the bimorphemic sequence CVC_i-C_i is as in (6).

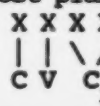
(6) Biplanar representation



Although the final consonants in (6) are identical, they are not adjacent at this stage in the derivation and so are not yet subject to the OCP. However, all segmental material is ultimately aligned by a process called plane conflation.

In languages which allow geminates, in conformity with the OCP, the two identical segmental melodies are automatically merged as a result of plane conflation. The post plane-conflation representation of CVC_i-C_i is then as in (7). What started out as a bimorphemic form in (6) is now indistinguishable from the corresponding monomorphemic form, CVC_iC_i.

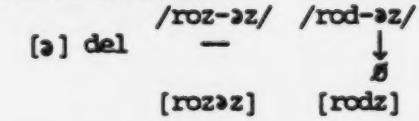
(7) Post plane-conflation representation



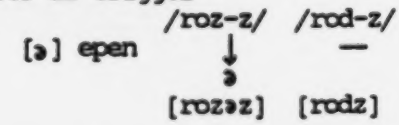
In languages which do not allow geminates, how the OCP operates across morpheme boundaries is a contentious issue. Some researchers (e.g. McCarthy 1986; see also Borowsky 1987) believe the OCP functions to block the application of any rule which will create a violation. Others (e.g. Yip 1988) argue that the OCP may also function to trigger the application of rules which repair violations.

In (8), the blocking versus triggering functions of the OCP are illustrated for the English plural. (I have ignored the assumptions of the Morphemic Plane Hypothesis for now.) Crucially, in the blocking analysis, the underlying representation of the plural morpheme must be /əz/ as in (8)A. The [ə] deletes everywhere except where an OCP violation would occur. Thus, [ə] deletes in roads but not in roses. In the triggering analysis in (8)B, the underlying representation of the plural morpheme is assumed to be /z/; epenthesis occurs whenever there is an OCP violation. Thus, epenthesis occurs in roses but not in roads.

(8)A. OCP as blocker



B. OCP as trigger



I will argue below that the acquisition data lead to the conclusion that in English the OCP operates to trigger [ə] epenthesis rather than to block [ə] deletion.

4. Acquisition of the [əz] allomorph of the plural.

Much research has focussed on the acquisition of the plural beginning with Berko's (1958) seminal paper on the subject. She found that the [əz] allomorph is the most difficult for children. This finding has been confirmed by many other researchers, both for data collected naturally and for data collected experimentally (e.g. Anisfeld & Tucker 1967, Bryant & Anisfeld 1969, Brown 1973, Ervin 1964, Miller & Ervin 1964, Hecht 1983).

A morphological explanation has often been provided for the late acquisition of [əz] (e.g. Berko 1958, Baker & Derwing 1982, see also Bybee & Slobin 1982). The child initially assumes sibilant-final roots are already inflected and, as a result, adds no further inflection. Berko states (p. 173): "a final sibilant makes a word plural". Despite the fact that this analysis intuitively seems correct, it is problematic for two reasons. One, the formal implication is that sibilant-final roots have two allomorphs. Rose, for instance, would have one allomorph /roz/ and another allomorph /ro/ to which the plural /z/ would be added. To my knowledge, no languages have morphological structures of this kind. If we assume following Pinker (1984) that the child's grammar at every stage is a possible adult grammar, this is not a possible analysis. Two, this explanation incorrectly predicts that deletion is the only strategy the child will entertain to avoid the [əz] allomorph.

Virtually all researchers who have looked at the acquisition of the [əz] allomorph have commented on the prevalence of deletion. A few have also mentioned the existence of another strategy, gemination. As mentioned in section 1, in gemination, the child adds [s] or [z] directly to the root, yielding [rozz] as the plural of rose, for instance. I use the term 'gemination' loosely since the clusters which result may not always be completely identical (cf. the plurals of roots which end in palatal sibilants).

Although gemination does not appear to be very common, the fact that it exists must be accounted for because it results in a violation of English phonotactic constraints; English does not allow tauto-syllabic long consonants. Actually, gemination may be more common than has been documented. Some examples may have been misanalysed as deletion since English speakers tend to hear identical consonant clusters as short.

I have extracted examples of gemination from Berko (1958) and Hecht (1983). The sibilant-final roots used in the two studies are provided in (9); those which underwent gemination are indicated.

(9) Examples of gemination strategy

A. Berko (1958).

Subjects: 80 children, 4-7 years of age

Sibilant-final nonsense words: tass [tæs] nizz [nɪz]
gutch [gʌtš] kazh [kaež]

Sibilant-final real words: glass

Examples of gemination: 10% of subjects - plural of gutch
5% of subjects - plural of kazh

B. Hecht (1983).
Subjects: 42 children, 2;10-5;10 years of age
Sibilant-final nonsense words: dass [dæs] fooz [fuz]
push [pʌš] gutch [gʌtš]
Sibilant-final real words: bus rose bush watch
Examples of gemination: 10% of subjects - plural of gutch
2% of subjects - plural of watch
2% of subjects - plurals of all sibilant-final words

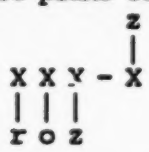
Both Berko and Hecht discuss the gemination strategy as an individual response pattern and so do not present much information on it across subjects. Hecht does mention that five of her forty-two subjects used the strategy some of the time; all of her subjects also used deletion. Those who used gemination tended to be her younger subjects (three three-year-olds, one four-year-old, and one five-year old), suggesting that gemination may be the first stage in the acquisition of [ə z]. Deletion would then be the second stage. This order of acquisition can only be hypothesized from the cross-sectional data; clearly, a longitudinal study looking at both gemination and deletion is in order.

5. Phonological account of the late acquisiton of [ə z].

I provide a phonological explanation for the late acquisition of the [ə z] allomorph, one that is rooted in the operation of the OCP. Recall that McCarthy argues that the OCP's only function is to block the application of rules which create violations. By blocking such rules rather than allowing them to apply and subsequently patching up the resultant violations, McCarthy claims that the OCP operates as a passive constraint. It is crucial for his analysis that the underlying representation of the plural morpheme be /ə z/. If it were simply /z/, he would incorrectly predict that that the plural of rose was [rozz], as illustrated in (10).

(10) Derivation of *[rozz] à la McCarthy

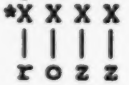
A. Pre plane-conflation



B. Post plane-conflation

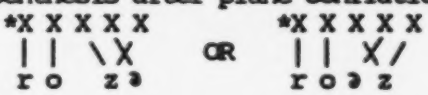
For McCarthy, there can be no intermediate stage (11) between (10)A and (10)B because this would violate the OCP. The form in (11) has undergone plane conflation but each [z] still has its own melody.

(11) Stage intermediate between (10)A and B



If (11) were allowed, epenthesis could apply at this stage yielding the correct [rozəz]. Epenthesis cannot take place after the planes are conflated in (10)B because this would result in a violation of the line crossing convention as in (12).

(12) Epenthesis after plane conflation



Yip (1988) argues for a weakened version of the OCP by allowing for the intermediate stage in (11). In fact, she claims that this ill-formed representation is exactly what triggers rules like [ə] epenthesis. For her, then, the underlying representation of the plural morpheme is /z/. The derivation of roses proceeds as in (13).

(13) Derivation of [rozəz] à la Yip

Yip views the OCP as an active constraint whose function is to mark a representation as ill-formed, thereby requiring that it be repaired. Plane conflation, then, does not automatically result in a form which is indistinguishable from one which is monomorphemic; there is an intermediate stage during which each [z] may have its own melody.

In terms of learnability, we may wish to adopt McCarthy's view over Yip's as (segmental) active constraints can be argued to be undesirable. They are simply statements of the conditions under which a particular rule or rules applies. As such, they are a derived property of the phonology and do not simplify the grammatical apparatus in any way; in fact, they add to its complexity in terms of storage.

McCarthy's view of the OCP is completely compatible with the gemination stage in the acquisition of the [əz] allomorph. The child hypothesizes that the OCP operates as a passive constraint. There is no stage during which it is violated and so the merging of the two identical segmental matrices and plane conflation happen simultaneously. To achieve the gemination result, though, we must assume that the child has postulated /z/ rather than /əz/ as the underlying representation.

Evidence for /z/ as underlying is as follows. One, recall that at the point at which the child is invoking the gemination strategy to deal with the [əz] allomorph, s/he is correctly adding [s/z] to non-sibilant obstruent-final stems and [z] to sonorant-final stems. Two, if the underlying representation were /əz/, we would expect the syllabic allomorphs to be acquired first since no rules need apply to derive the surface representations. Three, as the presence of [ə] breaks up two consonants resulting in a simpler syllable structure, we might expect the

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child to retain the underlying [ə] in some non-sibilant cases to avoid his/her having to produce difficult clusters; for example, we might expect to hear [dagəz] for dogs and [kaetəz] for cats. Further, there is evidence from adult English that the underlying representation is /z/. Recall that if the underlying representation is /əz/, the [ə] must delete everywhere except if an OCP violation were to result. Nonalternating inflections like the comparative, the superlative, and the progressive which are clearly /əC(C)/ underlyingly should then undergo the same syllabic-nonsyllabic alternations exhibited by the plural. However, their vowels never delete as shown in (14) for the superlative.

(14) Superlative inflection

biggest --> [bɪgəst], *[bɪgzd]	ripest --> [raipəst], *[raipst]
thinnest --> [θɪnəst], *[θɪnzd]	nicest --> [naisəst]

This indicates that the underlying representation of the plural must be a single consonant only, /z/. Additional evidence that the plural and superlative have different underlying representations (in terms of their syllabicity) is that children never overgeneralize deletion to the ungrammatical forms in (14), yielding *[bɪgzd] for instance.

The gemination strategy is abandoned by children once the constraint against tauto-syllabic geminates is acquired. In keeping with McCarthy's assumption about the operation of the OCP as a passive constraint, the child opts for deletion. The plural [s/z] is not syllabifiable after sibilant-final roots due to the constraint and is therefore subject to stray consonant erasure. This results in [roz], a form, albeit incorrect, which does not violate English phonotactics.

Ultimately, the child must acquire the adult representation. The deletion stage persists for some time. I suggest that this is because, to maintain the assumption that the OCP operates as a passive constraint, the child may only reach the adult stage if s/he postulates /əz/ as underlying. However, as mentioned earlier, there is evidence against this. The only other alternative is for the child to assume the OCP operates as an active constraint. Thus, as a result of plane conflation, the two segmental matrices are not immediately merged; instead, each still has its own segmental matrix. The OCP operates at this stage to trigger epenthesis.

This analysis requires that the operation of the OCP be parametrically determined. Note that the OCP's status as a universal constraint on representations is unaffected; only its operation, as a passive constraint or as an active constraint, must be determined on a language specific basis. I follow Hyams (1983) in claiming that the child does not require positive evidence to set the unmarked value of a parameter. In the case of the OCP, this results in him/her initially assuming that it operates as a passive constraint, regardless of the language s/he is acquiring. In English, where the OCP operates in the marked way as an active constraint, this correctly predicts overgeneralization, both as gemination and deletion. Of course, positive evidence is needed to reset the parameter to its marked value; this comes in the form of [ə] epenthesis.

Note.

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